

Department of Radiological Science

► General Introduction

In the department of Radiological Science, the study of Radiological Science which includes Radiation diagnosis and therapy, Nuclear medicine examination, Ultrasound examination, Magnetic resonance imaging system, PACS etc. are effectively taught to students through a balanced work between academic theory, experimental training and clinical training.

► Education Objectives

It is to build characters and prepare one to be professional in the medical field, to advocate and inspire professionalism in order to enhance the qualification of professionals in the work-field and, to educate and produce competent students in the Radiology department through practical education.

► Course Descriptions

Category	Seme-ster	Years	Code	Courses	Credit	Hours		Note
						theory	practice	
Basic Courses	1	Freshmen	02582	General Biology	3	3		
			01229	General Chemistry	3	3		
			02257	General Physics	3	3		
			02325	Mathematics	3	3		
Elective Courses	1	Freshmen	01324	Introduction to Radiological Science	3	3		
Basic Courses	2	Freshmen	01322	Medical Terminology	3	3		
			01677	Human Anatomy	3	3		
Required Courses	2	Freshmen	02113	Imagenology	3	3		
Required Courses	1	Sophomore	01676	Human Physiology	3	3		
			01326	Medical Photography	3	3		
			01328	Radiation Physics	3	3		
Elective Courses	1	Sophomore	01329	Introduction to Clinical Medicine	2	2		
			01650	Pathology	2	2		
			02825	Radiographic Imaging I	3	3		
			01333	Patient Care	2	2		
			01397	Electric and Electronic Engineering	2	2		
			03186	Introduction to Nuclear Engineering	2	2		
			01339	Imagenology Lab.	2		4	
Required Courses	2	Sophomore	01343	Radiobiology	3	3		
Elective Courses	2	Sophomore	02824	Health Medical Informatics	3	3		
			02826	Radiographic Imaging II	3	3		
			02827	Practice of Radiographic Imaging I	2		4	

			02451	Health Administration	2	2		
			03219	Atomic Energy related Law	2	2		
			02258	Practice of Electricity & Electronics	1		2	
			01336	Imaging Equipment	3	3		
			02452	Computed Tomography	3	3		
Required Courses	1	Junior	01335	Radiation Measurement	3	3		
			01344	Radiation Therapy	3	3		
			02021	Nuclear Medicine Technology	3	3		
			03089	Digital Medical Image Processing	3	3		
Elective Courses	1	Junior	02263	Magnetic Resonance Imaging	3	3		
			02828	Practice Radiographic Imaging II	2		4	
			02259	Ultrasonography	3	3		
			01361	Quality Control of Imaging Equipment	2	2		
Elective Courses	2	Junior	02265	Radiation Measurement Lab.	2		4	
			03188	Practice of Imaging Equipment & QC	2		4	
			02829	Fluoroscopic Imaging	3	3		
			02024	Practice of Ultrasound Technology	2		4	
			01353	Radiation Control	3	3		
			02830	Angiography & Interventional Imaging	3	3		
			02025	Practice of Radiation Therapy	2		4	
			02026	Practice of Nuclear Medicine Technology	2		4	
Elective Courses	1	Senior	02118	Clinical Practice I	3		9	
			02119	Clinical Practice II	3		9	
			01629	Public Health	3	3		
			01350	Imaging Anatomy & Pathology	3	3		
			01360	Radiochemistry & Radiation Chemistry	2	2		
			01331	Medical Insurance	2	2		
			02027	Clinical Pharmacology	2	2		
			01652	Health Care Statistics	2	2		
Required Courses	2	Senior	01812	Seminar on Radiological Science	3	3		
Elective Courses	2	Senior	01364	Diagnostic Image Reading	3	3		
			02066	Public Health Law	2	2		
			01332	Biochemistry	2	2		
			01367	Introduction to Non-Destructive Testing	2	2		
			01366	Medical Engineering	2	2		

► Course Descriptions (Special Course for Bachelor Degree)

Category	Seme-ster	Years	Code	Courses	Credit	Hours		Note
						theory	practice	
Cultural Core	1	Junior	01992	Living English I	3	3		
Cultural Elective	1	Junior	02247	Psychology of Relationship and Adjustment	3	3		
			01841	Introduction to Information Science	3	3		
			02248	Introduction to first Aids	3	3		
Elective courses	1	Junior	01328	Radiation Physics	3	3		
			01658	Biochemistry	3	3		
			00266	Advanced Computer Application	3	3		
			02266	Radiation Effect and Protection	3	3		
Cultural Core	2	Junior	01836	Christian Thought	3	3		
Cultural Elective	2	Junior	01839	Legal Medicine	3	3		
			01837	Introduction to Biomedical Engineering	3	3		
			01840	Basic Oriental Medicine	3	3		
Elective courses	2	Junior	02267	Ultrasonic Physics	3	3		
			01350	Imaging Anatomy and Pathology	3	3		
			02268	Introduction to Nuclear Medicine	3	3		
			02453	Health Administration	3	3		
Elective courses	1	Senior	02270	Introduction to Radiation Oncology	3	3		
			02272	Medical Imaging data Process	3	3		
			02273	Image Reading I	3	3		
			02274	Magnetic Resonance Imaging	3	3		
			02275	Clinical Pharmacology	3	3		
Elective courses	2	Senior	02276	Imaging Unit Quality Control	3	3		
			02277	Radiation Handling Technology	3	3		
			02278	PACS and Telecommunication Imaging System	3	3		
			02279	Image Reading II	3	3		
			01433	Medical Statistics	3	3		
			02280	Research for Radiological Science	3	3		

▶ **02582 General Biology**

This study is based on the theory Composition of element , Cell structure and function , metabolism, heredity, Generating process, and etc that creates life.

▶ **01229 General Chemistry**

It is the introduction of the basics of chemistry through out the whole chemistry. It is to study the organization and the nature of substances, mutual metamorphosis of substances, and etc. to understand the study of radial curriculum.

▶ **02257 General Physics**

The reason of studying the basic of nature science which is general physics is to understand the study of radial curriculum.

▶ **02325 Mathematics**

This lesson is to improve abilities in calculating ability, logical thought ability, and problem solving. This will help understand differential, integral calculus, series, etc. basic thinking.

▶ **01324 Introduction to Radiological Science**

Introduction of radiological science, including basic radiation physics, background radiation, atomic and nuclear structure, nuclear stability, alpha decay, negatron emission, positron emission and electron capture, gamma decay, activity, specific activity and concentration, photon Interactions in matter, X-ray generator, X-ray attenuation, etc.

▶ **01322 Medical Terminology**

By knowing the origin of the term and explanation of medical knowledge will help understand Radiation major and further more apply efficiency to team medical care.

▶ **01677 Human Anatomy**

To help understand the basic knowledge of the form of human body's each specific parts system, it will help understand the basic medical knowledge and use the knowledge to act in practical application.

▶ **02113 Imagenology**

Describe and demonstrate the proper procedures within the basic organizational structure of a clinical affiliated hospital' s Radiology and radiological image. Understand film processing room design and digital image processing & functions.

▶ **01676 Human Physiology**

The principles of human homeostatic mechanisms for understanding of pathologic processes.

▶ **01326 Medical Photography**

Medical Photography focused on Auto Film Process or helps to train students on the overall details of medical photographs, which includes understanding the material and manufacturing process to clarify the characteristics and nature of photographs as well as photo development and fixation process.

▶ **01328 Radiation Physics**

Fundamentals of radiation physics area are covered; structure of atoms and nuclei, wave mechanics, quantum mechanics, ionization theory and particle penetration in matter. Stability of nucleus, Radioactivity, Radioactive decay, Fission, Fusion, Gamma interaction in matter, and Neutron physics

▶ **01329 Introduction to Clinical Medicine**

Overview and fundamental knowledge in the clinical medicine.

▶ **01650 Pathology**

Pathology is offered to help students clearly understand the reasons, process and mechanism of various lesions and diseases composing the nature of diseases.

▶ **02825 Radiographic Imaging I**

Fluoroscopic imaging, viewing and recording the fluoroscopic image, radiographic image, body section radiography, stereoscopy, xeroradiography, computed tomography, digital radiography.

▶ **01333 Patient Care**

Patient Care is provided to improve the attitudes of health care providers by offering suitable training to help comprehend the psychological status of patients, paying attention to patients, and dealing with patients appropriately.

▶ **01397 Electric and Electronic Engineering**

Basic electronic circuit analysis and applications using transistor, diode, and operational amplifier, etc.

▶ **03186 Introduction to Nuclear Engineering**

Introduction to operational radiation safety, is that area of environmental health engineering that deals with the protection of the individual and population groups against the harmful effects of ionizing and non-ionizing radiation.

▶ **01339 Imagenology Lab.**

Use instruments of radiological devices for technologic practice. Learn kinds of clinical experiments in the basic theory. Describe the need of a performance evaluation in the image quality as it relates to the progress of the students learning experience. Understand practice of radiological technology and physical matters.

▶ **01343 Radiobiology**

The interdisciplinary field of science that studies the biological effects of ionizing and non-ionizing radiation of the whole electromagnetic spectrum, including radioactivity, x-rays, ultraviolet radiation, visible light, microwaves, radio wave, low-frequency radiation such as used in alternate electric transmission, ultrasound thermal radiation , and related modalities.

▶ **02824 Health Medical Informatics**

Health Medical Informatics is timely provided by giving instructions on computer theory to help deal with information of hospital administration, radiation operation, and radiation image readily.

▶ **02826 Radiographic Imaging II**

Fluoroscopic imaging, viewing and recording the fluoroscopic image, radiographic image, body section radiography, stereoscopy, xeroradiography, computed tomography, digital radiography.

▶ **02827 Practice of Radiographic Imaging I**

Practice Radiographic Imaging I helps students acquire actual shooting techniques through practicing, using equipment and instruments based on photographic technique theory over each shooting area such as the arms, legs, backbones, and pelvis.

▶ **02451 Health Administration**

health Administration helps comprehend the hospital administration system including management, personnel, and financial accounting by offering education on the overall management of the hospital.

▶ **03219 Atomic Energy related Law**

Atomic Energy related Law helps students systematically apprehend Atomic Energy Acts, enforcement ordinance, regulations, and announcement from Ministry of Science and Development in reference to radiation effect and protection.

▶ **02258 Practice of Electricity & Electronics**

Basic electronic circuit analysis and applications using transistor, diode, and operational amplifier, etc.

▶ **01336 Imaging Equipment**

Principles and applications of radiological equipments used in hospitals.

▶ **02452 Computed Tomography**

A medical imaging method employing tomography, Digital geometry processing is used to generate a three-dimensional image of the inside of an object from a large series of two-dimensional X-ray images taken around a single axis of rotation.

▶ **01335 Radiation Measurement**

General detector characteristics, gaseous detectors, scintillation detectors, semiconductors, signal processing circuits, and radiation measurements and detection.

▶ **01344 Radiation Therapy**

General detector characteristics, gaseous detectors, scintillation detectors, semiconductor detectors, signal processing circuits, and radiation measurements and detection.

▶ **02021 Nuclear Medicine Technology**

Branch of medicine and medical imaging that uses radioactive substances in therapy and diagnosis

▶ **03089 Digital Medical Image Processing**

Medical image processing and image analysis, provided descriptions of the methods currently being used or developed for enhancing the visual perception of digital medical images obtained by a wide variety of imaging modalities and for image analysis as a possible aid to detection and diagnosis.

▶ **02263 Magnetic Resonance Imaging**

Vector analysis, Coulomb's law, electrical and magnetic fields, Gauss's law, divergence theorem, energy and potential, dielectric material, Maxwell equations.

▶ **02828 Practice Radiographic Imaging II**

Practice Radiographic Imaging II is taught on the basis of image formation theory to control the amount and quality of radiation on target area and to analyze and evaluate the data selectively. The target area includes the cranial portion, cervical area, pubis, jaws, chest, abdomen, and breast.

▶ **02259 Ultrasonography**

Characteristics of ultrasound, sound theory, ultrasound diagnostic system, clinical applications

▶ **01361 Quality Control of Imaging Equipment**

Quality Control of Imaging Equipment helps train the students conduct QC (Quality Control) smoothly as to usage of medical imaging equipment through the application of image management, exposure management, equipment management, and administration management.

▶ **02265 Radiation Measurement Lab.**

Radiation Measurement Lab. provides the students with experiments such as basic practice in radiation measurement, experiment based on detection principles, measurement and modification of exposure dose and air dose, measurement of half-value layer, management and operation of radiation meter.

▶ **03188 Practice of Imaging Equipment & QC**

Practice of Imaging Equipment & QC (Quality Control) is provided to train the students to comprehend the formation of main circuit in the imaging equipment; the operating characteristics and performance checkup on equipment parts and the power system; cause of malfunction and measurement.

▶ **02829 Fluoroscopic Imaging**

Medical imaging technique used to visualize the inside, or lumen, of blood vessels and organs of the body, with particular interest in the arteries, veins and the heart chambers.

▶ **02024 Practice of Ultrasound Technology**

Characteristics of ultrasound, sound theory, ultrasound diagnostic system, clinical applications

▶ **01353 Radiation Control**

Radiation Control helps the students to learn a wide range of management including safe handling of radioactive resource, the range of allowed dose, radiation protection, waste disposal, and prevention of contingencies owing to increase in human exposure dose in light of expansion of radiation usage area.

▶ **02830 Angiography & Interventional Imaging**

Angiography & Interventional Imaging is provided to train students to have fully knowledge over various test methods and treatments performed from injection of contrast medium into the arteries and veins of the body for observation of vascular abnormalities to revascularization, angioplasty, thrombolysis, and embolization following angiography.

▶ **02025 Practice of Radiation Therapy**

Quality of X-ray beam, dose distribution and scatter analysis, isodose distribution. electron beam therapy, brachytherapy, total body irradiation, 3D conformal radiation therapy, intensity- modulated radiation therapy, intensity- modulated radiation therapy, stereotactic radiosurgery, prostate implants.

▶ **02026 Practice of Nuclear Medicine Technology**

Practice of Nuclear Medicine Technology helps the students to learn the process of how the tracer within the body from target organ is described through the visualized image, handling method of all the equipment, management of radioactive medical supplies, and principles of in vivo-in vitro test

▶ **02118 Clinical Practice I**

Arrangements made in variety of medical facilities for intensive clinical practice in radiological science in the use and performance of related technologies.

▶ **02119 Clinical Practice II**

Arrangements made in variety of medical facilities for intensive clinical practice in radiological science in the use and performance of related technologies.

▶ **01629 Public Health**

A study of public health from the aspects of historical background, management, and concepts of public health and related services.

▶ **01350 Imaging Anatomy & Pathology**

Basic knowledge of human organs such as structure, biochemical function, and physiology.

▶ **01360 Radiochemistry & Radiation Chemistry**

Radiochemistry & Radiation Chemistry aids the students in learning the chemical reaction to ionizing radiation.

▶ **01331 Medical Insurance**

Overall area of Medical Insurance including characteristics, historical change, elevation of status, present state and operation status is taught to aid the students in comprehending the medical insurance system as well as actual service such as charging for service fee which is needed on the job at health care institutions.

▶ **02027 Clinical Pharmacology**

Clinical Pharmacology is taught for the students to correctly understand the medicines and curative effect in clinical aspects by learning action mechanism of medicine, correlation between disease and medicine, and toxicity and side effects.

▶ **01652 Health Care Statistics**

Health Care Statistics focuses on bringing up the applicability of the students to statistically process and present all the clinical tasks with variables on the basis of probability, distribution, as well as statistical estimation and test.

▶ **01812 Seminar on Radiological Science**

This lecture is attended by resident physicians in radiology, by radiological technologists and by students beginning graduate study in medical physics and the field of radiation. In this lecture, Students learn articles of radiological science by searching in the web, on-line or science direct site. Identify the article of writing, reading, searching, and image information employed in the radiological imaging.

▶ **01364 Diagnostic Image Reading**

Reading for clinical medical images such as conventional radiography, ultrasonic image, MRI, CT, PET, nuclear medicine etc.

▶ **02066 Public Health Law**

Public Health Related Law appeals to the students and residents of the local community to clearly understand the law in order to make contributions to improve public health through the education of general law and other laws related to medical service.

▶ **01332 Biochemistry**

Biochemistry, which explains biological phenomena chemically, helps the students to understand glucide, lipid, protein, enzymes, and hormone in relation to radiation.

▶ **01367 Introduction to Non-Destructive Testing**

Introduction to NDT is taught to help students understand technical methods such as radiographic testing, ultrasonic examination, as well as penetration and leaking test, which are practiced to find out the characteristics, status, and internal structure without any other change in the material, original form of specimen, or function.

▶ **01366 Medical Engineering**

Criticality hazard, nuclear fission, fission products, multiplication factor, reactivity and reactor control, fission product inventory, criticality control.

Special Course for Bachelor Degree

▶ **01992 Living English I**

This subject is designed to help students better understand cultures whose first language is English and raise skills of communication in the foreign language by making them memorizing English words, idioms and sentences.

▶ **02247 Psychology of Relationship and Adjustment**

An introductory course to the study of human behavior, scanning briefly the stage of human development and focusing on perception, learning, thinking, motivation, individuality and personality. It also touches at each stage in life ; differential effects of wholesome and inadequate development to personality adjustment.

▶ **01841 Introduction to Information Science**

In this rapidly changing society, a variety of computation devices are being used to effectively process and

manage a great deal of information. Thus this subject is designed to make students raise skills of information processing using computers and other devices and learn programming languages and tools for making the processing more systematic and effective.

▶ **02248 Introduction to First Aids**

The goal of first aid is to save life, to prevent an injury or illness from worsening, or to help speed recovery. First aid for cardiac arrest, choking, bleeding, minor wounds, and minor soft tissue injuries are discussed in the lecture and practice.

▶ **01328 Radiation Physics**

Fundamentals of radiation physics area are covered; structure of atoms and nuclei, wave mechanics, quantum mechanics, ionization theory and particle penetration in matter. Stability of nucleus, Radioactivity, Radioactive decay, Fission, Fusion, Gamma interaction in matter, and Neutron physics

▶ **01658 Biochemistry**

Biochemistry is taught to help students understand the structure and characteristics of basic materials that control vital phenomena such as protein, glucide, substrate, nucleic acid, enzymes, and hormone. Basic contents of biochemistry such as energy conversion, self replication process and information transfer, basic concepts on vivo metabolism and metabolic control are taught during the course.

▶ **00266 Advanced Computer Application**

Use of computer, Health information with emphasis on radiological image and medical information to increase basic IT. Demonstrate an understanding of the hospital network. State and understand the general application of digital image. Understand basic communication of network architecture.

▶ **02266 Radiation Effect and Protection**

Radiation Effect and Protection is taught for students to fully apprehend radiation monitoring method and techniques to have knowledge on the standards and principles of protection from radiation; and to apprehend and assess the radiation effects on the body in order to understand and prevent the disability due to radiation

▶ **01836 Christian Thought**

This subject is designed to find the way to coexistence between human and God, clarify the true meaning of human existence and help understand major religions of the world. With the overview of key Christian factors, <Truth, Love, Service>, which are also ideas of this university's foundation, the study describes that such ideas could contribute to establishing better ways of thinking and values of the present generation who will lead the future world.

▶ **01839 Legal Medicine**

This subject is introduction to forensic science and forensic medicine.

▶ **01837 Introduction to Biomedical Engineering**

The aim is to educate intellection and scientific Biomedical engineering research by overall understanding Biomedical engineering conception and Biomedical engineering area.

▶ **01840 Basic Oriental Medicine**

The object of this course is to provide students with the foundations in Oriental medical treatment and the concept of oriental medical thought about the treatment of diseases fundamentally handled only by western medicine.

▶ **02267 Ultrasonic Physics**

Characteristics of ultrasound, sound theory, ultrasound diagnostic system, clinical applications

▶ **01350 Imaging Anatomy and Pathology**

Basic knowledge of human organs such as structure, biochemical function, and physiology.

▶ **02268 Introduction to Nuclear Medicine**

Introduction to Nuclear Medicine is provided to help understand how to inject radioactive isotopes into the body; take external measurement and record of accumulators within the target organs using a variety of nuclear medicine equipment followed by quantitative analysis using samples.

▶ **02453 Health Administration**

health Administration helps comprehend the hospital administration system including management, personnel, and financial accounting by offering education on the overall management of the hospital.

▶ **02270 Introduction to Radiation Oncology**

Introduction to Radiation Oncology introduces general descriptions on the occurrence of tumors and mechanism of the cause as well as treatment using radiation.

▶ **02272 Medical Imaging data Process**

Describes image processing approach the subject either from a mathematical perspective or using a computer science approach. Image & Signal processing refers to the manipulation and analysis of pictorial information, for example by improving, correcting, changing, or analyzing the image. Understand acknowledgment of digital image processing tools in the medical image.

▶ **02273 Image Reading I**

Reading for clinical medical images such as conventional radiography, ultrasonic image, MRI, CT, PET, nuclear medicine etc.

▶ **02274 Magnetic Resonance Imaging**

Vector analysis, Coulomb's law, electrical and magnetic fields, Gauss's law, divergence theorem, energy and potential, dielectric material, Maxwell equations.

▶ **02275 Clinical Pharmacology**

Clinical Pharmacology is taught for the students to correctly understand the medicines and curative effect in clinical aspects by learning action mechanism of medicine, correlation between disease and medicine, and toxicity and side effects.

▶ **02276 Image Unit Quality Control**

Image Unit Quality Control aids students in learning about user-centered management of equipment by understanding the principles and practicing quality control focusing on diagnostic image unit.

▶ **02277 Radiation Handling Technology**

Radiation dosimetry, radiation protection guides, philosophy of radiation protection, basic for radiation safety regulations, health physics instrumentation, external radiation protection, internal radiation protection.

▶ **02278 PACS and Telecommunication Imaging System**

Describes current developments in Picture Archiving and Communications System technology, with particular emphasis on integration of the new and emerging imaging technologies into the hospital environment and the provision of means for rapid retrieval and transmission of imaging data. Understand data transmissions of hospital network in the telecommunications, since they will enable access via telemedicine to remote or underdeveloped areas.

▶ **02279 Image Reading II**

Image Reading II is provided to help students comprehend what is considered the standard valuable image through study of the basic anatomic structure and basic lesion described on CT, MRI and ultrasonic images,

▶ **01433 Medical Statistics**

Fundamental statistics techniques for treating data analysis from the radiation measurements and detection.

▶ **02280 Research for Radiological Science**

Describe the program of advanced radiological science. This lecture is attended by radiological technologists and by students beginning graduate study in medical physics and the field of radiation. In this lecture, Students learn articles of radiological science by searching in the web. Identify the article of writing, reading, researching, and image information employed in the radiological articles.